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PHYSICS

BOOKS - SAI PHYSICS (TELUGU ENGLISH)

QUESTION PAPER

Physics

1. An iron rod of length $1.5m$ lying on a horizontal table is pulled up from one end

along a vertical line so as to move it with a constant velocity 3m/s, while the other end of the rod slides along the floor. After how much time the speed of the end sliding on the floor equals to the speed of the end being pulled up.

A. $\frac{1}{2\sqrt{2}}s$

B. $\frac{1}{\sqrt{2}}s$

C. $3\sqrt{2}s$

D. $\frac{1}{4}s$

Answer: A

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2. A body rotates abut a stationary axis. If the angular deceleratin is proportional to square root of angular speed, then the mean angular speed of the body, given ω_0 as the initial angular speed, is

A. $\frac{\omega_0}{\sqrt{2}}$

B. $\frac{\omega_0}{4}$

C. $\frac{\omega_0}{2}$

D. $\frac{\omega_0}{3}$

Answer: B

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3. A uniform sphere of radius Rand mass m is placed on an inclined plane which makes an angle 45° to the horizontal. For which of the following value of coefficient of friction, the sphere rolls without slipping,

A. $\frac{3}{7}$

B. $\frac{1}{2}$

C. $\frac{5}{8}$

D. $\frac{1}{7}$

Answer: A::B::C

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4. A circular ring of mass 10 kg rolls along a horizontal floor. The center of mass of the ring has a speed $1.5m/s$. The work required to stop the ring is

A. $10J$

B. $-6J$

C. $14.5J$

D. $-22.5J$

Answer: D

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5. A vessel of volume V contains ideal gas having mass density ρ at temperature T and pressure P. After a portion of the gas is let out,

the pressure in the vessel is decreased by ΔP. The mass of the released gas is

A. $\rho V \Delta P / P$

B. $\frac{\Delta P}{P}$

C. $\frac{\rho}{P}$

D. $(\rho V)^2 \Delta P / P$

Answer: A

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6. A cup of coffee cools from $150^\circ F$ to 144° F m 1 min in a room at $72^\circ F$. How much time will the coffee take to cool from $110^\circ F$ to $104^\circ F$ in the same room ?

A. 1.55 min

B. 2.14 min

C. 2.89 min

D. 3.35 min

Answer: B

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7. An ideal gas at initial temperature T_9 and initial volume V_0 is expanded adiabatically to a volume $2V_0$. The gas is then ecp[anded isothermally to a volume $5V_0$ and there after compressed adiabatically so that the temperature of tha gas becomes again T_0. If the final volume of the gas is αV_0 then the value of constant α is

A. 2.5

B. 1.5

C. 2.0

D. 3.0

Answer: A

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8. The pass axes of two polarizers were kept such that the incident unpolarized beam of intensity $I_0,$ gets completely blocked. Another polarizer was introduced in between these two polarizers with its pass axis 60° with

respect to the pass axis of the first one. The output intensity would then become

A. 0

B. $\frac{3}{32}I_0$

C. $\frac{3}{16}I_0$

D. $\frac{3}{8}I_0$

Answer: B

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9. A negative charge is placed at the centre of the non-conducting sphere. The direction of electric field on any point at the surface of the sphere is

A. Radially inward

B. Radially outward

C. Along the tangent to the surface

D. No electric field produced

Answer: A

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10. A magnetic field of 5×10^{-5} T is produced at a perpendicular distance of 0.2 m from a long straight wire carrying electric current. If the permeability of free space is $4\pi \times 10^{-7} Tm/A$, the current passing through the wire in A is

A. 45

B. 40

C. 50

D. 30

Answer: C

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11. A long wire carries a current of 18 A kept along the axis of a long solenoid of radius 1 cm. The field due to the solenoid is $8 \times 10^{-3} T$. The magnitude of the resultant field at a point 0.6 mm from the solenoid axis

is

(Assume $\mu_0 = 4\pi \times 10^{-7} Tm/A$)

A. $6 \times 10^{-3} T$

B. $6 \times 10^{-4} T$

C. $2\sqrt{7} \times 10^{-3} T$

D. $10 \times 10^{-3} T$

Answer: D

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12. In a traveling plane electromagnetic wave, the maximum magnetic field is $1.26 \times 10^{-4} T$. The intensity of the wave is (Assume $\mu_0 = 1.2610^{-6} H/m$)

A. $1.56 \times 10^6 W/m^2$

B. $1.89 \times 10^6 W/m^2$

C. $8.92 \times 10^5 W/m^2$

D. $4.62 \times 10^6 W/m^2$

Answer: B

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13. A cobalt plate is placed at a distance of 1 m from a point source of power 1 W Assume a circular area of the plate of radius $r = 1A^{\circ}$. A is exposed to the radiation and ejects photoelectrons. The light energy is considered to be spread uniformly and the work function of cobalt is 5 eV. The minimum time the target should be exposed to the light source to eject a photoelectron (assuming no reflection losses) is

A. 320 s

B. 450 s

C. 860 s

D. 100 s

Answer: D

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14. A hydogene sample is prepared in a particular excited state A of quantum number $n_A = 3$. The ground state energy of

hydrogen atom is $-|E|$. The photons of energy $\frac{|E|}{12}$ are absorbed in the sample with results in excitation some electrons to excited state B of quantum number n_B, whose value is

A. 6

B. 4

C. 5

D. 7

Answer: A

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